

SEQUENCE LISTING

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OKUDA, MITSUYOSHI  
SAEKI, KATSUHISA  
KUBOTA, HIROMI  
HITOMI, JUN  
KAGEYAMA, YASUSHI  
SHIKATA, SHITSUW  
NOMURA, MASAFUMI

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<141> 2000-04-06

<150> PCT/JP98/04528

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| Leu | Ser | Thr | Val | Ala | Leu | Asn | Asn | Pro | Ser | Ala | Gly | Asp | Ala | Arg | Thr |    |
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| Phe | Asp | Leu | Asp | Phe | Lys | Gly | Ile | Gln | Thr | Thr | Thr | Asp | Val | Ser | Gly |     |
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| Phe | Ser | Lys | Gln | Arg | Gln | Thr | Gly | Ala | Ala | Ala | Phe | Leu | Val | Glu | Ser |     |
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| Pro | Ala | Asn | Asn | Lys | Leu | His | Ile | Val | Gln | Phe | Asn | Gly | Pro | Ile | Leu |     |

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90

95

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| Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val Gln |      |
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| agc caa gca ttc agt gca ggt gcc aga att cat aca aac tcc tgg ggg | 1008 |

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Ser | Gln | Ala | Phe | Ser | Ala | Gly | Ala | Arg | Ile | His | Thr | Asn | Ser | Trp | Gly |      |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |      |
| gca | gcg | gtg | aat | ggg | gcc | tac | acg | aca | gat | tcc | aga | aat | gtg | gat | gac | 1056 |
| Ala | Ala | Val | Asn | Gly | Ala | Tyr | Thr | Thr | Asp | Ser | Arg | Asn | Val | Asp | Asp |      |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |      |
| tat | gta | agg | aaa | aat | gat | atg | acg | att | ctt | ttc | gcg | gct | ggg | aat | gaa | 1104 |
| Tyr | Val | Arg | Lys | Asn | Asp | Met | Thr | Ile | Leu | Phe | Ala | Ala | Gly | Asn | Glu |      |
|     |     |     | 355 |     |     |     | 360 |     |     |     |     | 365 |     |     |     |      |
| agg | ccg | aac | ggc | ggg | acc | atc | agt | gca | cct | ggg | acg | gct | aaa | aac | gcc | 1152 |
| Arg | Pro | Asn | Gly | Gly | Thr | Ile | Ser | Ala | Pro | Gly | Thr | Ala | Lys | Asn | Ala |      |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |      |
| ata | aca | gtc | ggc | gca | acc | gaa | aac | ctg | cgt | cca | agc | ttc | ggg | tcc | tat | 1200 |
| Ile | Thr | Val | Gly | Ala | Thr | Glu | Asn | Leu | Arg | Pro | Ser | Phe | Gly | Ser | Tyr |      |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |      |
| gca | gat | aat | att | aac | cac | gtt | gca | cag | ttc | tct | tcc | cgt | ggc | ccg | aca | 1248 |
| Ala | Asp | Asn | Ile | Asn | His | Val | Ala | Gln | Phe | Ser | Ser | Arg | Gly | Pro | Thr |      |
|     |     |     |     | 405 |     |     |     | 410 |     |     |     |     |     | 415 |     |      |
| aaa | gat | ggg | cga | atc | aag | cct | gat | gtc | atg | gcg | cca | ggg | aca | tac | att | 1296 |
| Lys | Asp | Gly | Arg | Ile | Lys | Pro | Asp | Val | Met | Ala | Pro | Gly | Thr | Tyr | Ile |      |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |      |
| tta | tca | gca | aga | tct | tct | ctt | gca | ccc | gat | tcc | tcc | ttc | tgg | gcg | aat | 1344 |
| Leu | Ser | Ala | Arg | Ser | Ser | Leu | Ala | Pro | Asp | Ser | Ser | Phe | Trp | Ala | Asn |      |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |      |
| cat | gac | agc | aaa | tat | gcc | tat | atg | ggg | gga | acg | tcc | atg | gca | aca | ccg | 1392 |
| His | Asp | Ser | Lys | Tyr | Ala | Tyr | Met | Gly | Gly | Thr | Ser | Met | Ala | Thr | Pro |      |
|     | 450 |     |     |     |     | 455 |     |     |     | 460 |     |     |     |     |     |      |
| att | gtt | gcg | ggg | aat | gtt | gca | cag | ctc | cgt | gag | cat | ttt | gtg | aaa | aat | 1440 |
| Ile | Val | Ala | Gly | Asn | Val | Ala | Gln | Leu | Arg | Glu | His | Phe | Val | Lys | Asn |      |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     | 480 |     |      |
| aga | gga | atc | act | cct | aag | cct | tcc | cta | ttg | aaa | gca | gct | ttg | att | gca | 1488 |
| Arg | Gly | Ile | Thr | Pro | Lys | Pro | Ser | Leu | Leu | Lys | Ala | Ala | Leu | Ile | Ala |      |
|     |     |     |     | 485 |     |     |     | 490 |     |     |     |     | 495 |     |     |      |
| ggg | gct | gct | gat | gtt | gga | ttg | ggg | tat | ccg | aac | gga | aac | caa | gga | tgg | 1536 |
| Gly | Ala | Ala | Asp | Val | Gly | Leu | Gly | Tyr | Pro | Asn | Gly | Asn | Gln | Gly | Trp |      |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |      |
| ggc | cga | gtg | acc | ctg | gat | aaa | tcg | ttg | aac | gtt | gcc | tat | gtg | aac | gaa | 1584 |
| Gly | Arg | Val | Thr | Leu | Asp | Lys | Ser | Leu | Asn | Val | Ala | Tyr | Val | Asn | Glu |      |
|     |     | 515 |     |     |     |     | 520 |     |     |     | 525 |     |     |     |     |      |
| tcc | agt | gcc | cta | tca | act | agc | caa | aaa | gcg | aca | tat | acc | ttt | act | gca | 1632 |
| Ser | Ser | Ala | Leu | Ser | Thr | Ser | Gln | Lys | Ala | Thr | Tyr | Thr | Phe | Thr | Ala |      |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |      |
| acg | gcg | ggc | aag | cca | ttg | aaa | atc | tcc | ctg | gta | tgg | tcg | gat | gcc | cct | 1680 |
| Thr | Ala | Gly | Lys | Pro | Leu | Lys | Ile | Ser | Leu | Val | Trp | Ser | Asp | Ala | Pro |      |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |      |

|   |      |
|---|------|
| gca agc act act gct tct gta acc ctg gtc aat gat ttg gat ttg gtc | 1728 |
| Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu Val |      |
| 565 570 575   |      |

|   |      |
|---|------|
| att aca gca cca aac gga aca aga tat gtc ggg aat gac ttc tca gca | 1776 |
| Ile Thr Ala Pro Asn Gly Thr Arg Tyr Val Gly Asn Asp Phe Ser Ala |      |
| 580 585 590   |      |

|   |      |
|---|------|
| cca ttt gac aat aac tgg gat ggc cgc aat aac gta gaa aat gta ttt | 1824 |
| Pro Phe Asp Asn Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val Phe |      |
| 595 600 605   |      |

|   |      |
|---|------|
| att aat tcg ccc caa agt gga aca tat acc att gag gtg caa gca tat | 1872 |
| Ile Asn Ser Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala Tyr |      |
| 610 615 620   |      |

|   |      |
|---|------|
| aat gtg ccg gtt gga cca caa aac ttc tcg ttg gca att gtg aac taa | 1920 |
| Asn Val Pro Val Gly Pro Gln Asn Phe Ser Leu Ala Ile Val Asn     |      |
| 625 630 635   |      |

<210> 4

<211> 639

<212> PRT

<213> Bacillus sp.

<400> 4

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|---|
| Met Arg Lys Lys Lys Val Phe Leu Ser Val Leu Ser Ala Ala Ala Ile |
| 1 5 10 15   |

|   |
|---|
| Leu Ser Thr Val Ala Leu Asn Asn Pro Ser Ala Gly Asp Ala Arg Thr |
| 20 25 30  |

|   |
|---|
| Phe Asp Leu Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Val Ser Gly |
| 35 40 45  |

|   |
|---|
| Phe Ser Lys Gln Arg Gln Thr Gly Ala Ala Ala Phe Leu Val Glu Ser |
| 50 55 60  |

|   |
|---|
| Glu Asn Val Lys Leu Leu Lys Gly Leu Leu Lys Lys Leu Glu Thr Val |
| 65 70 75 80   |

|   |
|---|
| Pro Ala Asn Asn Lys Leu His Ile Val Gln Phe Asn Gly Pro Ile Leu |
| 85 90 95  |

|   |
|---|
| Glu Glu Thr Lys Gln Lys Leu Glu Thr Thr Gly Ala Lys Ile Leu Asp |
| 100 105 110   |

Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val Gln  
115 120 125

Ser Lys Val Arg Ser Ile Glu His Val Glu Ser Val Glu Pro Tyr Leu  
130 135 140

Pro Lys Tyr Lys Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser Thr  
145 150 155 160

Leu Val Lys Ala Leu Ala Leu Asp Thr Lys Gln Asn Asn Lys Glu Val  
165 170 175

Gln Leu Arg Gly Ile Glu Glu Ile Ala Gln Tyr Val Ala Ser Asn Asp  
180 185 190

Val His Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp Val  
195 200 205

Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly Leu  
210 215 220

Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp Thr  
225 230 235 240

Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile Thr  
245 250 255

Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn Gly  
260 265 270

His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ala Thr Asn  
275 280 285

Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met Asp  
290 295 300

Ser Ser Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu Phe  
305 310 315 320

Ser Gln Ala Phe Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp Gly  
325 330 335

Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp Asp  
340 345 350

Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn Glu  
355 360 365

Arg Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn Ala  
370 375 380

Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser Tyr  
385 390 395 400

Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro Thr  
405 410 415

Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Tyr Ile  
420 425 430

Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala Asn  
435 440 445

His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr Pro  
450 455 460

Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys Asn  
465 470 475 480

Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile Ala  
485 490 495

Gly Ala Ala Asp Val Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly Trp  
500 505 510

Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn Glu  
515 520 525

Ser Ser Ala Leu Ser Thr Ser Gln Lys Ala Thr Tyr Thr Phe Thr Ala  
530 535 540

Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala Pro  
545 550 555 560

Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu Val  
565 570 575

Ile Thr Ala Pro Asn Gly Thr Arg Tyr Val Gly Asn Asp Phe Ser Ala  
580 585 590

Pro Phe Asp Asn Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val Phe  
 595 600 605

Ile Asn Ser Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala Tyr  
 610 615 620

Asn Val Pro Val Gly Pro Gln Asn Phe Ser Leu Ala Ile Val Asn  
 625 630 635

<210> 5

<211> 1923

<212> DNA

<213> Bacillus sp.

<220>

<221> CDS

<222> (1)..(1923)

<400> 5

|   |    |
|---|----|
| atg aga aag aag aaa aag gtg ttt tta tct gtt tta tca gct gca gcg | 48 |
| Met Arg Lys Lys Lys Lys Val Phe Leu Ser Val Leu Ser Ala Ala Ala |    |
| 1 5 10 15   |    |

|   |    |
|---|----|
| att ttg tcg act gtt gcg tta agt aat cca tct gca ggt ggt gca agg | 96 |
| Ile Leu Ser Thr Val Ala Leu Ser Asn Pro Ser Ala Gly Gly Ala Arg |    |
| 20 25 30  |    |

|   |     |
|---|-----|
| aat ttt gat ctg gat ttc aaa gga att cag aca aca act gat gct aaa | 144 |
| Asn Phe Asp Leu Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Ala Lys |     |
| 35 40 45  |     |

|   |     |
|---|-----|
| ggg ttc tcc aag cag ggg cag act ggt gct gct gct ttt ctg gtg gaa | 192 |
| Gly Phe Ser Lys Gln Gly Gln Thr Gly Ala Ala Ala Phe Leu Val Glu |     |
| 50 55 60  |     |

|   |     |
|---|-----|
| tct gaa aat gtg aaa ctc cca aaa ggt ttg cag aag aag ctt gaa aca | 240 |
| Ser Glu Asn Val Lys Leu Pro Lys Gly Leu Gln Lys Lys Leu Glu Thr |     |
| 65 70 75 80   |     |

|   |     |
|---|-----|
| gtc ccg gca aat aat aaa ctc cat att atc caa ttc aat gga cca att | 288 |
| Val Pro Ala Asn Asn Lys Leu His Ile Ile Gln Phe Asn Gly Pro Ile |     |
| 85 90 95  |     |

|   |     |
|---|-----|
| tta gaa gaa aca aaa cag cag ctg gaa aaa aca ggg gca aag att ctc | 336 |
| Leu Glu Glu Thr Lys Gln Gln Leu Glu Lys Thr Gly Ala Lys Ile Leu |     |
| 100 105 110   |     |

|   |      |
|---|------|
| gac tac ata cct gat tat gct tac att gtc gag tat gag ggc gat gtt<br>Asp Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val<br>115 120 125     | 384  |
| aag tca gca aca agc acc att gag cac gtg gaa tcc gtg gag cct tat<br>Lys Ser Ala Thr Ser Thr Ile Glu His Val Glu Ser Val Glu Pro Tyr<br>130 135 140     | 432  |
| ttg ccg ata tac aga ata gat ccc cag ctt ttc aca aaa ggg gca tca<br>Leu Pro Ile Tyr Arg Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser<br>145 150 155 160 | 480  |
| gag ctt gta aaa gca gtg gcg ctt gat aca aag cag aaa aat aaa gag<br>Glu Leu Val Lys Ala Val Ala Leu Asp Thr Lys Gln Lys Asn Lys Glu<br>165 170 175     | 528  |
| gtg caa tta aga ggc atc gaa caa atc gca caa ttc gca ata agc aat<br>Val Gln Leu Arg Gly Ile Glu Gln Ile Ala Gln Phe Ala Ile Ser Asn<br>180 185 190     | 576  |
| gat gtg cta tat att acg gca aag cct gag tat aag gtg atg aat gat<br>Asp Val Leu Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp<br>195 200 205     | 624  |
| gtt gcg cgt gga att gtc aaa gcg gat gtg gct cag agc agc tac ggg<br>Val Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly<br>210 215 220     | 672  |
| ttg tat gga caa gga cag atc gta gcg gtt gcc gat aca ggg ctt gat<br>Leu Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp<br>225 230 235 240 | 720  |
| aca ggt cgc aat gac agt tcg atg cat gaa gcc ttc cgc ggg aaa att<br>Thr Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile<br>245 250 255     | 768  |
| act gca tta tat gca ttg gga cgg acg aat aat gcc aat gat acg aat<br>Thr Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn<br>260 265 270     | 816  |
| ggt cat ggt acg cat gtg gct ggc tcc gta tta gga aac ggc tcc act<br>Gly His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ser Thr<br>275 280 285     | 864  |
| aat aaa gga atg gcg cct cag gcg aat cta gtc ttc caa tct atc atg<br>Asn Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met<br>290 295 300     | 912  |
| gat agc ggt ggg gga ctt gga gga cta cct tcg aat ctg caa acc tta<br>Asp Ser Gly Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu<br>305 310 315 320 | 960  |
| ttc agc caa gca tac agt gct ggt gcc aga att cat aca aac tcc tgg<br>Phe Ser Gln Ala Tyr Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp<br>325 330 335     | 1008 |
| gga gca gca gtg aat ggg gct tac aca aca gat tcc aga aat gtg gat<br>Gly Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp<br>340 345 350     | 1056 |

|   |      |
|---|------|
| gac tat gtg cgc aaa aat gat atg acg atc ctt ttc gct gcc ggg aat | 1104 |
| Asp Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn |      |
| 355 360 365   |      |
| gaa gga ccg aac ggc gga acc atc agt gca cca ggc aca gct aaa aat | 1152 |
| Glu Gly Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn |      |
| 370 375 380   |      |
| gca ata aca gtc gga gct acg gaa aac ctc cgc cca agc ttt ggg tct | 1200 |
| Ala Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser |      |
| 385 390 395 400   |      |
| tat gcg gac aat atc aac cat gtg gca cag ttc tct tca cgt gga ccg | 1248 |
| Tyr Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro |      |
| 405 410 415   |      |
| aca aag gat gga cgg atc aaa ccg gat gtc atg gca ccg gga acg ttc | 1296 |
| Thr Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Phe |      |
| 420 425 430   |      |
| ata cta tca gca aga tct tct ctt gca ccg gat tcc tcc ttc tgg gcg | 1344 |
| Ile Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala |      |
| 435 440 445   |      |
| aac cat gac agt aaa tat gca tac atg ggt gga acg tcc atg gct aca | 1392 |
| Asn His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr |      |
| 450 455 460   |      |
| ccg atc gtt gct gga aac gtg gca cag ctt cgt gag cat ttt gtg aaa | 1440 |
| Pro Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys |      |
| 465 470 475 480   |      |
| aac aga ggc atc aca cca aag cct tct cta tta aaa gcg gca ctg att | 1488 |
| Asn Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile |      |
| 485 490 495   |      |
| gcc ggt gca gct gac atc ggc ctt ggc tac ccg aac ggt aac caa gga | 1536 |
| Ala Gly Ala Ala Asp Ile Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly |      |
| 500 505 510   |      |
| tgg gga cga gtg aca ttg gat aaa tcc ctg aac gtt gcc tat gtg aac | 1584 |
| Trp Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn |      |
| 515 520 525   |      |
| gag tcc agt tct cta tcc acc agc caa aaa gcg acg tac tcg ttt act | 1632 |
| Glu Ser Ser Ser Leu Ser Thr Ser Gln Lys Ala Thr Tyr Ser Phe Thr |      |
| 530 535 540   |      |
| gct act gcc ggc aag cct ttg aaa atc tcc ctg gta tgg tct gat gcc | 1680 |
| Ala Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala |      |
| 545 550 555 560   |      |
| cct gcg agc aca act gct tcc gta acg ctt gtc aat gat ctg gac ctt | 1728 |
| Pro Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu |      |
| 565 570 575   |      |
| gtc att acc gct cca aat ggc aca cag tat gta gga aat gac ttt act | 1776 |
| Val Ile Thr Ala Pro Asn Gly Thr Gln Tyr Val Gly Asn Asp Phe Thr |      |
| 580 585 590   |      |

|   |      |
|---|------|
| tcg cca tac aat gat aac tgg gat ggc cgc aat aac gta gaa aat gta | 1824 |
| Ser Pro Tyr Asn Asp Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val |      |
| 595 600 605   |      |

|   |      |
|---|------|
| ttt att aat gca cca caa agc ggg acg tat aca att gag gta cag gct | 1872 |
| Phe Ile Asn Ala Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala |      |
| 610 615 620   |      |

|   |      |
|---|------|
| tat aac gta ccg gtt gga cca cag acc ttc tcg ttg gca att gtg aat | 1920 |
| Tyr Asn Val Pro Val Gly Pro Gln Thr Phe Ser Leu Ala Ile Val Asn |      |
| 625 630 635 640   |      |

|     |      |
|-----|------|
| taa | 1923 |
|-----|------|

<210> 6

<211> 640

<212> PRT

<213> Bacillus sp.

<400> 6

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|---|
| Met Arg Lys Lys Lys Lys Val Phe Leu Ser Val Leu Ser Ala Ala Ala |
| 1 5 10 15   |

|   |
|---|
| Ile Leu Ser Thr Val Ala Leu Ser Asn Pro Ser Ala Gly Gly Ala Arg |
| 20 25 30  |

|   |
|---|
| Asn Phe Asp Leu Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Ala Lys |
| 35 40 45  |

|   |
|---|
| Gly Phe Ser Lys Gln Gly Gln Thr Gly Ala Ala Ala Phe Leu Val Glu |
| 50 55 60  |

|   |
|---|
| Ser Glu Asn Val Lys Leu Pro Lys Gly Leu Gln Lys Lys Leu Glu Thr |
| 65 70 75 80   |

|   |
|---|
| Val Pro Ala Asn Asn Lys Leu His Ile Ile Gln Phe Asn Gly Pro Ile |
| 85 90 95  |

|   |
|---|
| Leu Glu Glu Thr Lys Gln Gln Leu Glu Lys Thr Gly Ala Lys Ile Leu |
| 100 105 110   |

|   |
|---|
| Asp Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val |
| 115 120 125   |

Lys Ser Ala Thr Ser Thr Ile Glu His Val Glu Ser Val Glu Pro Tyr  
130 135 140

Leu Pro Ile Tyr Arg Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser  
145 150 155 160

Glu Leu Val Lys Ala Val Ala Leu Asp Thr Lys Gln Lys Asn Lys Glu  
165 170 175

Val Gln Leu Arg Gly Ile Glu Gln Ile Ala Gln Phe Ala Ile Ser Asn  
180 185 190

Asp Val Leu Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp  
195 200 205

Val Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly  
210 215 220

Leu Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp  
225 230 235 240

Thr Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile  
245 250 255

Thr Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn  
260 265 270

Gly His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ser Thr  
275 280 285

Asn Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met  
290 295 300

Asp Ser Gly Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu  
305 310 315 320

Phe Ser Gln Ala Tyr Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp  
325 330 335

Gly Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp  
340 345 350

Asp Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn  
355 360 365

Glu Gly Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn  
370 375 380

Ala Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser  
385 390 395 400

Tyr Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro  
405 410 415

Thr Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Phe  
420 425 430

Ile Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala  
435 440 445

Asn His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr  
450 455 460

Pro Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys  
465 470 475 480

Asn Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile  
485 490 495

Ala Gly Ala Ala Asp Ile Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly  
500 505 510

Trp Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn  
515 520 525

Glu Ser Ser Ser Leu Ser Thr Ser Gln Lys Ala Thr Tyr Ser Phe Thr  
530 535 540

Ala Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala  
545 550 555 560

Pro Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu  
565 570 575

Val Ile Thr Ala Pro Asn Gly Thr Gln Tyr Val Gly Asn Asp Phe Thr  
580 585 590

Ser Pro Tyr Asn Asp Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val  
595 600 605

Phe Ile Asn Ala Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala  
 610 615 620

Tyr Asn Val Pro Val Gly Pro Gln Thr Phe Ser Leu Ala Ile Val Asn  
 625 630 635 640

<210> 7

<211> 1923

<212> DNA

<213> Bacillus sp.

<220>

<221> CDS

<222> (1) .. (1923)

<400> 7

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| atg | aga | aag | aag | aaa | aag | gtg | ttt | tta | tct | gtt | tta | tca | gct | gca | gcg | 48 |
| Met | Arg | Lys | Lys | Lys | Lys | Val | Phe | Leu | Ser | Val | Leu | Ser | Ala | Ala | Ala |    |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |    |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| att | ttg | tcg | act | gtt | gcg | tta | agt | aat | cca | tct | gca | ggg | ggg | gca | agg | 96 |
| Ile | Leu | Ser | Thr | Val | Ala | Leu | Ser | Asn | Pro | Ser | Ala | Gly | Gly | Ala | Arg |    |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |    |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aat | ttt | gat | ctg | gat | ttc | aaa | gga | att | cag | aca | aca | act | gat | gct | aaa | 144 |
| Asn | Phe | Asp | Leu | Asp | Phe | Lys | Gly | Ile | Gln | Thr | Thr | Thr | Asp | Ala | Lys |     |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ggg | ttc | tcc | aag | cag | ggg | cag | act | ggg | gct | gct | gct | ttt | ctg | gtg | gaa | 192 |
| Gly | Phe | Ser | Lys | Gln | Gly | Gln | Thr | Gly | Ala | Ala | Ala | Phe | Leu | Val | Glu |     |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tct | gaa | aat | gtg | aaa | ctc | cca | aaa | ggg | ttg | cag | aag | aag | ctt | gaa | aca | 240 |
| Ser | Glu | Asn | Val | Lys | Leu | Pro | Lys | Gly | Leu | Gln | Lys | Lys | Leu | Glu | Thr |     |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gtc | ccg | gca | aat | aat | aaa | ctc | cat | att | atc | caa | ttc | aat | gga | cca | att | 288 |
| Val | Pro | Ala | Asn | Asn | Lys | Leu | His | Ile | Ile | Gln | Phe | Asn | Gly | Pro | Ile |     |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tta | gaa | gaa | aca | aaa | cag | cag | ctg | gaa | aaa | aca | ggg | gca | aag | att | ctc | 336 |
| Leu | Glu | Glu | Thr | Lys | Gln | Gln | Leu | Glu | Lys | Thr | Gly | Ala | Lys | Ile | Leu |     |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gac | tac | ata | cct | gat | tat | gct | tac | att | gtc | gag | tat | gag | ggc | gat | gtt | 384 |
| Asp | Tyr | Ile | Pro | Asp | Tyr | Ala | Tyr | Ile | Val | Glu | Tyr | Glu | Gly | Asp | Val |     |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |     |

|   |      |
|---|------|
| aag tca gca aca agc acc att gag cac gtg gaa tcc gtg gag cct tat | 432  |
| Lys Ser Ala Thr Ser Thr Ile Glu His Val Glu Ser Val Glu Pro Tyr |      |
| 130 135 140   |      |
| ttg ccg ata tac aga ata gat ccc cag ctt ttc aca aaa ggg gca tca | 480  |
| Leu Pro Ile Tyr Arg Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser |      |
| 145 150 155 160   |      |
| gag ctt gta aaa gca gtg gcg ctt gat aca aag cag aaa aat aaa gag | 528  |
| Glu Leu Val Lys Ala Val Ala Leu Asp Thr Lys Gln Lys Asn Lys Glu |      |
| 165 170 175   |      |
| gtg caa tta aga ggc atc gaa caa atc gca caa ttc gca ata agc aat | 576  |
| Val Gln Leu Arg Gly Ile Glu Gln Ile Ala Gln Phe Ala Ile Ser Asn |      |
| 180 185 190   |      |
| gat gtg cta tat att acg gca aag cct gag tat aag gtg atg aat gat | 624  |
| Asp Val Leu Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp |      |
| 195 200 205   |      |
| gtt gcg cgt gga att gtc aaa gcg gat gtg gct cag agc agc tac ggg | 672  |
| Val Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly |      |
| 210 215 220   |      |
| ttg tat gga caa gga cag atc gta gcg gtt gcc gat aca ggg ctt gat | 720  |
| Leu Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp |      |
| 225 230 235 240   |      |
| aca ggt cgc aat gac agt tcg atg cat gaa gcc ttc cgc ggg aaa att | 768  |
| Thr Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile |      |
| 245 250 255   |      |
| act gca tta tat gca ttg gga cgg acg aat aat gcc aat gat acg aat | 816  |
| Thr Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn |      |
| 260 265 270   |      |
| ggt cat ggt acg cat gtg gct ggc tcc gta tta gga aac ggc tcc act | 864  |
| Gly His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ser Thr |      |
| 275 280 285   |      |
| aat aaa gga atg gcg cct cag gcg aat cta gtc ttc caa tct atc atg | 912  |
| Asn Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met |      |
| 290 295 300   |      |
| gat agc ggt ggg gga ctt gga gga cta cct tcg aat ctg caa acc tta | 960  |
| Asp Ser Gly Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu |      |
| 305 310 315 320   |      |
| ttc agc caa gca tac agt gct ggt gcc aga att cat aca aac tcc tgg | 1008 |
| Phe Ser Gln Ala Tyr Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp |      |
| 325 330 335   |      |
| gga gca gca gtg aat ggg gct tac aca aca gat tcc aga aat gtg gat | 1056 |
| Gly Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp |      |
| 340 345 350   |      |
| gac tat gtg cgc aaa aat gat atg acg atc ctt ttc gct gcc ggg aat | 1104 |
| Asp Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn |      |
| 355 360 365   |      |

|   |      |
|---|------|
| gaa gga ccg aac ggc gga acc atc agt gca cca ggc aca gct aaa aat | 1152 |
| Glu Gly Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn |      |
| 370 375 380   |      |
| gca ata aca gtc gga gct acg gaa aac ctc cgc cca agc ttt ggg tct | 1200 |
| Ala Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser |      |
| 385 390 395 400   |      |
| tat gcg gac aat atc aac cat gtg gca cag ttc tct tca cgt gga ccg | 1248 |
| Tyr Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro |      |
| 405 410 415   |      |
| aca aag gat gga cgg atc aaa ccg gat gtc atg gca ccg gga acg ttc | 1296 |
| Thr Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Phe |      |
| 420 425 430   |      |
| ata cta tca gca aga tct tct ctt gca ccg gat tcc tcc ttc tgg gcg | 1344 |
| Ile Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala |      |
| 435 440 445   |      |
| aac cat gac agt aaa tat gca tac atg ggt gga acg tcc atg gct aca | 1392 |
| Asn His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr |      |
| 450 455 460   |      |
| ccg atc gtt gct gga aac gtg gca cag ctt cgt gag cat ttt gtg aaa | 1440 |
| Pro Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys |      |
| 465 470 475 480   |      |
| aac aga ggc atc aca cca aag cct tct cta tta aaa gcg gca ctg att | 1488 |
| Asn Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile |      |
| 485 490 495   |      |
| gcc ggt gca gct gac atc ggc ctt ggc tac ccg aac ggt aac caa gga | 1536 |
| Ala Gly Ala Ala Asp Ile Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly |      |
| 500 505 510   |      |
| tgg gga cga gtg aca ttg gat aaa tcc ctg aac gtt gcc tat gtg aac | 1584 |
| Trp Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn |      |
| 515 520 525   |      |
| gag tcc agt tct cta tcc acc agc caa aaa gcg acg tac tcg ttt act | 1632 |
| Glu Ser Ser Ser Leu Ser Thr Ser Gln Lys Ala Thr Tyr Ser Phe Thr |      |
| 530 535 540   |      |
| gct act gcc ggc aag cct ttg aaa atc tcc ctg gta tgg tct gat gcc | 1680 |
| Ala Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala |      |
| 545 550 555 560   |      |
| cct gcg agc aca act gct tcc gta acg ctt gtc aat gat ctg gac ctt | 1728 |
| Pro Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu |      |
| 565 570 575   |      |
| gtc att acc gct cca aat ggc aca cag tat gta gga aat gac ttt act | 1776 |
| Val Ile Thr Ala Pro Asn Gly Thr Gln Tyr Val Gly Asn Asp Phe Thr |      |
| 580 585 590   |      |
| tcg cca tac aat gat aac tgg gat ggc cgc aat aac gta gaa aat gta | 1824 |
| Ser Pro Tyr Asn Asp Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val |      |
| 595 600 605   |      |

ttt att aat gca cca caa agc ggg acg tat aca att gaa gta cag gct 1872  
Phe Ile Asn Ala Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala  
610 615 620

tat aac gta ccg gtt gga cca cag aac ttc tcg ttg gca att gtg aat 1920  
Tyr Asn Val Pro Val Gly Pro Gln Asn Phe Ser Leu Ala Ile Val Asn  
625 630 635 640

taa 1923

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<213> Bacillus sp.

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1 5 10 15

Ile Leu Ser Thr Val Ala Leu Ser Asn Pro Ser Ala Gly Gly Ala Arg  
20 25 30

Asn Phe Asp Leu Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Ala Lys  
35 40 45

Gly Phe Ser Lys Gln Gly Gln Thr Gly Ala Ala Ala Phe Leu Val Glu  
50 55 60

Ser Glu Asn Val Lys Leu Pro Lys Gly Leu Gln Lys Lys Leu Glu Thr  
65 70 75 80

Val Pro Ala Asn Asn Lys Leu His Ile Ile Gln Phe Asn Gly Pro Ile  
85 90 95

Leu Glu Glu Thr Lys Gln Gln Leu Glu Lys Thr Gly Ala Lys Ile Leu  
100 105 110

Asp Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val  
115 120 125

Lys Ser Ala Thr Ser Thr Ile Glu His Val Glu Ser Val Glu Pro Tyr  
130 135 140

Leu Pro Ile Tyr Arg Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser  
 145 150 155 160

Glu Leu Val Lys Ala Val Ala Leu Asp Thr Lys Gln Lys Asn Lys Glu  
 165 170 175

Val Gln Leu Arg Gly Ile Glu Gln Ile Ala Gln Phe Ala Ile Ser Asn  
 180 185 190

Asp Val Leu Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp  
 195 200 205

Val Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly  
 210 215 220

Leu Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp  
 225 230 235 240

Thr Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile  
 245 250 255

Thr Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn  
 260 265 270

Gly His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ser Thr  
 275 280 285

Asn Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met  
 290 295 300

Asp Ser Gly Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu  
 305 310 315 320

Phe Ser Gln Ala Tyr Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp  
 325 330 335

Gly Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp  
 340 345 350

Asp Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn  
 355 360 365

Glu Gly Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn  
 370 375 380

Ala Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser  
385 390 395 400

Tyr Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro  
405 410 415

Thr Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Phe  
420 425 430

Ile Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala  
435 440 445

Asn His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr  
450 455 460

Pro Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys  
465 470 475 480

Asn Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile  
485 490 495

Ala Gly Ala Ala Asp Ile Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly  
500 505 510

Trp Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn  
515 520 525

Glu Ser Ser Ser Leu Ser Thr Ser Gln Lys Ala Thr Tyr Ser Phe Thr  
530 535 540

Ala Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala  
545 550 555 560

Pro Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu  
565 570 575

Val Ile Thr Ala Pro Asn Gly Thr Gln Tyr Val Gly Asn Asp Phe Thr  
580 585 590

Ser Pro Tyr Asn Asp Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val  
595 600 605

Phe Ile Asn Ala Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala  
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Tyr Asn Val Pro Val Gly Pro Gln Asn Phe Ser Leu Ala Ile Val Asn  
 625                      630                      635                      640

<210> 9

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<213> Bacillus sp.

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Asn Asp Val Ala Arg His Ile Val Lys Ala Asp Val Ala Gln Ser Ser  
 1                      5                      10                      15

Tyr Gly Leu Tyr  
                     20

<210> 10

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<212> PRT

<213> Bacillus sp.

<400> 10

Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly Leu  
 1                      5                      10

<210> 11

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Ile Lys Pro Asp Val Met Ala Pro Gly Thr Tyr Ile Leu  
 1                      5                      10

<210> 12

<211> 20

<212> PRT

<213> Bacillus sp.

<400> 12

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Ala | Ile | Thr | Val | Gly | Ala | Thr | Glu | Asn | Leu | Arg | Pro | Ser | Phe | Gly |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |

|     |     |     |     |
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| Ser | Tyr | Ala | Asp |
|     |     |     | 20  |

<210> 13

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<400> 13

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| Lys | Asn | Asp | Met | Val | Ile | Leu | Phe | Ala | Ala | Gly | Asn | Glu | Gly | Pro | Asn |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |

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<220>

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24

<210> 15

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23

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23

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23

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23

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21

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21

<210> 23

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20

<210> 24

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21

SEQUENCE LISTING

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<120> Alkaline Protease

<130> FP-KS-0498

<150> JP 09-274570

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148, 160, 165, 172, 183, 187, 188, 189, 194, 286, 306, 324, 369, 431, 501,  
531, 541, 584, 591, 592, 594, 595, 596, 611, 632

<223> Xaa=arbitraty amino acid

<400>

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Arg | Lys | Lys | Lys | Val | Phe | Leu | Ser | Val | Leu | Ser | Ala | Ala | Ala | Ile |
| 1   |     |     | 5   |     |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Leu | Ser | Thr | Val | Ala | Leu | Xaa | Asn | Pro | Ser | Ala | Gly | Xaa | Ala | Arg | Xaa |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     |     | 30  |     |
| Phe | Asp | Leu | Asp | Phe | Lys | Gly | Ile | Gln | Thr | Thr | Thr | Asp | Xaa | Xaa | Gly |
|     |     |     | 35  |     |     |     | 40  |     |     |     |     |     | 45  |     |     |
| Phe | Ser | Lys | Gln | Xaa | Gln | Thr | Gly | Ala | Ala | Ala | Phe | Leu | Val | Glu | Ser |
|     |     |     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |
| Glu | Asn | Val | Lys | Leu | Xaa | Lys | Gly | Leu | Xaa | Lys | Lys | Leu | Glu | Thr | Val |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Pro | Ala | Asn | Asn | Lys | Leu | His | Ile | Xaa | Gln | Phe | Asn | Gly | Pro | Ile | Leu |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Glu | Glu | Thr | Lys | Gln | Xaa | Leu | Glu | Xaa | Thr | Gly | Ala | Lys | Ile | Leu | Asp |
|     |     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |
| Tyr | Ile | Pro | Asp | Tyr | Ala | Tyr | Ile | Val | Glu | Tyr | Glu | Gly | Asp | Val | Xaa |
|     |     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |
| Ser | Xaa | Xaa | Xaa | Xaa | Ile | Glu | His | Val | Glu | Ser | Val | Glu | Pro | Tyr | Leu |
|     |     |     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |
| Pro | Xaa | Tyr | Xaa | Ile | Asp | Pro | Gln | Leu | Phe | Thr | Lys | Gly | Ala | Ser | Xaa |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     | 160 |     |
| Leu | Val | Lys | Ala | Xaa | Ala | Leu | Asp | Thr | Lys | Gln | Xaa | Asn | Lys | Glu | Val |
|     |     |     |     | 165 |     |     |     |     |     | 170 |     |     |     | 175 |     |
| Gln | Leu | Arg | Gly | Ile | Glu | Xaa | Ile | Ala | Gln | Xaa | Xaa | Xaa | Ser | Asn | Asp |
|     |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |
| Val | Xaa | Tyr | Ile | Thr | Ala | Lys | Pro | Glu | Tyr | Lys | Val | Met | Asn | Asp | Val |
|     |     |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |

|   |     |     |     |
|---|-----|-----|-----|
| Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly Leu |     |     |     |
| 210   | 215 | 220 |     |
| Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp Thr |     |     |     |
| 225   | 230 | 235 | 240 |
| Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile Thr |     |     |     |
| 245   | 250 | 255 |     |
| Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn Gly |     |     |     |
| 260   | 265 | 270 |     |
| His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Xaa Thr Asn |     |     |     |
| 275   | 280 | 285 |     |
| Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met Asp |     |     |     |
| 290   | 295 | 300 |     |
| Ser Xaa Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu Phe |     |     |     |
| 305   | 310 | 315 | 320 |
| Ser Gln Ala Xaa Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp Gly |     |     |     |
| 325   | 330 | 335 |     |
| Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp Asp |     |     |     |
| 340   | 345 | 350 |     |
| Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn Glu |     |     |     |
| 355   | 360 | 365 |     |
| Xaa Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn Ala |     |     |     |
| 370   | 375 | 380 |     |
| Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser Tyr |     |     |     |
| 385   | 390 | 395 | 400 |
| Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro Thr |     |     |     |
| 405   | 410 | 415 |     |

Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Xaa Ile

420

425

430

Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala Asn

435

440

445

His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr Pro

450

455

460

Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys Asn

465

470

475

480

Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile Ala

485

490

495

Gly Ala Ala Asp Xaa Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly Trp

500

505

510

Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn Glu

515

520

525

Ser Ser Xaa Leu Ser Thr Ser Gln Lys Ala Thr Tyr Xaa Phe Thr Ala

530

535

540

Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala Pro

545

550

555

560

Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu Val

565

570

575

Ile Thr Ala Pro Asn Gly Thr Xaa Tyr Val Gly Asn Asp Phe Xaa Xaa

580

585

590

Pro Xaa Xaa Xaa Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val Phe

595

600

605

Ile Asn Xaa Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala Tyr

610

615

620

Asn Val Pro Val Gly Pro Gln Xaa Phe Ser Leu Ala Ile Val Asn

625

630

635

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<211> 640

<212> PRT

<213> *Bacillus sp.*

<220>

<221> misc\_\_feature

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149, 161, 166, 173, 184, 188, 189, 190, 195, 287, 307, 325, 370, 432, 502,

532, 542, 585, 592, 593, 595, 596, 597, 612, 633

<223> Xaa=arbitrary amino acid

<400>

Met Arg Xaa Lys Lys Lys Val Phe Leu Ser Val Leu Ser Ala Ala Ala

1

5

10

15

Ile Leu Ser Thr Val Ala Leu Xaa Asn Pro Ser Ala Gly Xaa Ala Arg

20

25

30

Xaa Phe Asp Leu Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Xaa Xaa

35

40

45

Gly Phe Ser Lys Gln Xaa Gln Thr Gly Ala Ala Ala Phe Leu Val Glu

50

55

60

Ser Glu Asn Val Lys Leu Xaa Lys Gly Leu Xaa Lys Lys Leu Glu Thr

65

70

75

80

Val Pro Ala Asn Asn Lys Leu His Ile Xaa Gln Phe Asn Gly Pro Ile

|   |                                     |     |     |
|---|-------------------------------------|-----|-----|
| 85  | 90                                  | 95  |     |
| Leu Glu Glu Thr Lys Gln Xaa                                     | Leu Glu Xaa Thr Gly Ala Lys Ile Leu |     |     |
| 100   | 105                                 | 110 |     |
| Asp Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val |                                     |     |     |
| 115   | 120                                 | 125 |     |
| Xaa Ser Xaa Xaa Xaa Xaa Ile Glu His Val Glu Ser Val Glu Pro Tyr |                                     |     |     |
| 130   | 135                                 | 140 |     |
| Leu Pro Xaa Tyr Xaa Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser |                                     |     |     |
| 145   | 150                                 | 155 | 160 |
| Xaa Leu Val Lys Ala Xaa Ala Leu Asp Thr Lys Gln Xaa Asn Lys Glu |                                     |     |     |
| 165   | 170                                 | 175 |     |
| Val Gln Leu Arg Gly Ile Glu Xaa Ile Ala Gln Xaa Xaa Xaa Ser Asn |                                     |     |     |
| 180   | 185                                 | 190 |     |
| Asp Val Xaa Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp |                                     |     |     |
| 195   | 200                                 | 205 |     |
| Val Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly |                                     |     |     |
| 210   | 215                                 | 220 |     |
| Leu Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp |                                     |     |     |
| 225   | 230                                 | 235 | 240 |
| Thr Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile |                                     |     |     |
| 245   | 250                                 | 255 |     |
| Thr Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn |                                     |     |     |
| 260   | 265                                 | 270 |     |
| Gly His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Xaa Thr |                                     |     |     |
| 275   | 280                                 | 285 |     |
| Asn Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met |                                     |     |     |

|   |     |         |
|---|-----|---------|
| 290   | 295 | 300     |
| Asp Ser Xaa Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu |     |         |
| 305   | 310 | 315 320 |
| Phe Ser Gln Ala Xaa Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp |     |         |
| 325   | 330 | 335     |
| Gly Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp |     |         |
| 340   | 345 | 350     |
| Asp Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn |     |         |
| 355   | 360 | 365     |
| Glu Xaa Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn |     |         |
| 370   | 375 | 380     |
| Ala Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser |     |         |
| 385   | 390 | 395 400 |
| Tyr Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro |     |         |
| 405   | 410 | 415     |
| Thr Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Xaa |     |         |
| 420   | 425 | 430     |
| Ile Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala |     |         |
| 435   | 440 | 445     |
| Asn His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr |     |         |
| 450   | 455 | 460     |
| Pro Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys |     |         |
| 465   | 470 | 475 480 |
| Asn Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile |     |         |
| 485   | 490 | 495     |
| Ala Gly Ala Ala Asp Xaa Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly |     |         |

|   |     |     |
|---|-----|-----|
| 500   | 505 | 510 |
| Trp Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn |     |     |
| 515   | 520 | 525 |
| Glu Ser Ser Xaa Leu Ser Thr Ser Gln Lys Ala Thr Tyr Xaa Phe Thr |     |     |
| 530   | 535 | 540 |
| Ala Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala |     |     |
| 545   | 550 | 555 |
| Pro Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu |     |     |
| 565   | 570 | 575 |
| Val Ile Thr Ala Pro Asn Gly Thr Xaa Tyr Val Gly Asn Asp Phe Xaa |     |     |
| 580   | 585 | 590 |
| Xaa Pro Xaa Xaa Xaa Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val |     |     |
| 595   | 600 | 605 |
| Phe Ile Asn Xaa Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala |     |     |
| 610   | 615 | 620 |
| Tyr Asn Val Pro Val Gly Pro Gln Xaa Phe Ser Leu Ala Ile Val Asn |     |     |
| 625   | 630 | 635 |
|   |     | 640 |

<210> 3

<211> 1920

<212> DNA

<213> *Bacillus sp.*

<400>

atg aga aag aag aag gtg ttt tta tct gtt tta tca gct gca gcg att 48  
Met Arg Lys Lys Lys Val Phe Leu Ser Val Leu Ser Ala Ala Ala Ile

|     |     |     |     |   |
|-----|-----|-----|-----|---|
| 1   | 5   | 10  | 15  |   |
| ctg | tcg | act | gtt | gca tta aac aat ccc tcg gct ggt gat gca agg act 96      |
| Leu | Ser | Thr | Val | Ala Leu Asn Asn Pro Ser Ala Gly Asp Ala Arg Thr         |
|     | 20  | 25  | 30  |   |
|     | ttt | gat | ctg | gat ttt aaa gga att caa aca aca acc gat gtc agt ggt 144 |
|     | Phe | Asp | Leu | Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Val Ser Gly     |
|     | 35  | 40  | 45  |   |
|     | ttc | tcc | aaa | cag cga caa aca ggt gcg gct gca ttt ctg gtg gag tct 192 |
|     | Phe | Ser | Lys | Gln Arg Gln Thr Gly Ala Ala Ala Phe Leu Val Glu Ser     |
|     | 50  | 55  | 60  |   |
|     | gaa | aat | gtg | aaa ctt ctt aaa gga ttg cta aag aaa ctt gaa aca gta 240 |
|     | Glu | Asn | Val | Lys Leu Leu Lys Gly Leu Leu Lys Lys Leu Glu Thr Val     |
|     | 65  | 70  | 75  | 80  |
|     | ccg | gca | aat | aat aaa ctc cat att gtc caa ttc aat ggc ccc att tta 288 |
|     | Pro | Ala | Asn | Asn Lys Leu His Ile Val Gln Phe Asn Gly Pro Ile Leu     |
|     | 85  | 90  | 95  |   |
|     | gaa | gaa | aca | aaa cag aag cta gag aca act gga gca aag att ctc gac 336 |
|     | Glu | Glu | Thr | Lys Gln Lys Leu Glu Thr Thr Gly Ala Lys Ile Leu Asp     |
|     | 100 | 105 | 110 |   |
|     | tac | atc | cct | gat tat gca tat att gtc gag tat gag ggg gat gtt cag 384 |
|     | Tyr | Ile | Pro | Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val Gln     |
|     | 115 | 120 | 125 |   |
|     | tca | aaa | gtc | cgc tcc att gaa cac gtg gaa tca gtg gag cca tac ttg 432 |
|     | Ser | Lys | Val | Arg Ser Ile Glu His Val Glu Ser Val Glu Pro Tyr Leu     |
|     | 130 | 135 | 140 |   |
|     | ccg | aaa | tac | aaa ata gat ccc cag ctt ttc aca aaa ggc gca tcg acg 480 |

Pro Lys Tyr Lys Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser Thr  
 145 150 155 160  
 ctg gtg aaa gcg ttg gcg ctt gat acg aag cag aac aat aaa gaa gtg 528  
 Leu Val Lys Ala Leu Ala Leu Asp Thr Lys Gln Asn Asn Lys Glu Val  
 165 170 175  
 caa tta aga ggc atc gag gaa atc gct cag tac gta gca agc aat gac 576  
 Gln Leu Arg Gly Ile Glu Glu Ile Ala Gln Tyr Val Ala Ser Asn Asp  
 180 185 190  
 gtc cat tat att acg gca aag cct gaa tat aag gtg atg aat gat gtg 624  
 Val His Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp Val  
 195 200 205  
 gcc aga ggt att gtc aaa gcg gat gtg gca cag agc agc tac ggt ttg 672  
 Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly Leu  
 210 215 220  
 tat gga caa ggc cag att gtc gca gtt gcc gat act gga ttg gat aca 720  
 Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp Thr  
 225 230 235 240  
 gga aga aac gac agt tcg atg cat gaa gcc ttc cgc ggt aaa ata aca 768  
 Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile Thr  
 245 250 255  
 gca cta tat gca ctg ggt cgg acg aat aat gcg aat gat acg aac ggt 816  
 Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn Gly  
 260 265 270  
 cat ggt acc cat gtg gca ggt tcg gta tta gga aat ggc gca acg aat 864  
 His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ala Thr Asn  
 275 280 285

aaa gga atg gca cct caa gcg aat ctg gtt ttt caa tcc atc atg gat 912  
 Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met Asp  
 290 295 300  
 agc agt ggt ggg ctt gga ggc ttg cct tcc aat ctg caa acc tta ttc 960  
 Ser Ser Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu Phe  
 305 310 315 320  
 agc caa gca ttc agt gca ggt gcc aga att cat aca aac tcc tgg ggg 1008  
 Ser Gln Ala Phe Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp Gly  
 325 330 335  
 gca gcg gtg aat ggg gcc tac acg aca gat tcc aga aat gtg gat gac 1056  
 Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp Asp  
 340 345 350  
 tat gta agg aaa aat gat atg acg att ctt ttc gcg gct ggg aat gaa 1104  
 Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn Glu  
 355 360 365  
 agg ccg aac ggc ggt acc atc agt gca cct ggt acg gct aaa aac gcc 1152  
 Arg Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn Ala  
 370 375 380  
 ata aca gtc ggc gca acc gaa aac ctg cgt cca agc ttc ggt tcc tat 1200  
 Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser Tyr  
 385 390 395 400  
 gca gat aat att aac cac gtt gca cag ttc tct tcc cgt ggc ccg aca 1248  
 Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro Thr  
 405 410 415  
 aaa gat ggg cga atc aag cct gat gtc atg gcg cca ggg aca tac att 1296  
 Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Tyr Ile

|  |     |     |     |
|--|-----|-----|-----|
| 420  | 425 | 430 |     |
| tta tca gca aga tct tct ctt gca ccc gat tcc tcc ttc tgg gcg aat 1344 |     |     |     |
| Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala Asn      |     |     |     |
| 435  | 440 | 445 |     |
| cat gac agc aaa tat gcc tat atg ggt gga acg tcc atg gca aca ccg 1392 |     |     |     |
| His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr Pro      |     |     |     |
| 450  | 455 | 460 |     |
| att gtt gcg ggg aat gtt gca cag ctc cgt gag cat ttt gtg aaa aat 1440 |     |     |     |
| Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys Asn      |     |     |     |
| 465  | 470 | 475 | 480 |
| aga gga atc act cct aag cct tcc cta ttg aaa gca gct ttg att gca 1488 |     |     |     |
| Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile Ala      |     |     |     |
| 485  | 490 | 495 |     |
| ggg gct gct gat gtt gga ttg ggt tat ccg aac gga aac caa gga tgg 1536 |     |     |     |
| Gly Ala Ala Asp Val Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly Trp      |     |     |     |
| 500  | 505 | 510 |     |
| ggc cga gtg acc ctg gat aaa tcg ttg aac gtt gcc tat gtg aac gaa 1584 |     |     |     |
| Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn Glu      |     |     |     |
| 515  | 520 | 525 |     |
| tcc agt gcc cta tca act agc caa aaa gcg aca tat acc ttt act gca 1632 |     |     |     |
| Ser Ser Ala Leu Ser Thr Ser Gln Lys Ala Thr Tyr Thr Phe Thr Ala      |     |     |     |
| 530  | 535 | 540 |     |
| acg gcg ggc aag cca ttg aaa atc tcc ctg gta tgg tcg gat gcc cct 1680 |     |     |     |
| Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala Pro      |     |     |     |
| 545  | 550 | 555 | 560 |
| gca agc act act gct tct gta acc ctg gtc aat gat ttg gat ttg gtc 1728 |     |     |     |

Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu Val

565

570

575

att aca gca cca aac gga aca aga tat gtc ggg aat gac ttc tca gca 1776

Ile Thr Ala Pro Asn Gly Thr Arg Tyr Val Gly Asn Asp Phe Ser Ala

580

585

590

cca ttt gac aat aac tgg gat ggc cgc aat aac gta gaa aat gta ttt 1824

Pro Phe Asp Asn Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val Phe

595

600

605

att aat tcg ccc caa agt gga aca tat acc att gag gtg caa gca tat 1872

Ile Asn Ser Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala Tyr

610

615

620

aat gtg ccg gtt gga cca caa aac ttc tcg ttg gca att gtg aac taa 1920

Asn Val Pro Val Gly Pro Gln Asn Phe Ser Leu Ala Ile Val Asn

625

630

635

<210> 4

<211> 1923

<212> DNA

<213> *Bacillus sp.*

<400>

atg aga aag aag aaa aag gtg ttt tta tct gtt tta tca gct gca gcg 48

Met Arg Lys Lys Lys Lys Val Phe Leu Ser Val Leu Ser Ala Ala Ala

1

5

10

15

att ttg tcg act gtt gcg tta agt aat cca tct gca ggt ggt gca agg 96

Ile Leu Ser Thr Val Ala Leu Ser Asn Pro Ser Ala Gly Gly Ala Arg

|   |     |     |     |
|---|-----|-----|-----|
| 20  | 25  | 30  |     |
| aat ttt gat ctg gat ttc aaa gga att cag aca aca act gat gct aaa 144 |     |     |     |
| Asn Phe Asp Leu Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Ala Lys     |     |     |     |
| 35  | 40  | 45  |     |
| ggt ttc tcc aag cag ggg cag act ggt gct gct gct ttt ctg gtg gaa 192 |     |     |     |
| Gly Phe Ser Lys Gln Gly Gln Thr Gly Ala Ala Ala Phe Leu Val Glu     |     |     |     |
| 50  | 55  | 60  |     |
| tct gaa aat gtg aaa ctc cca aaa ggt ttg cag aag aag ctt gaa aca 240 |     |     |     |
| Ser Glu Asn Val Lys Leu Pro Lys Gly Leu Gln Lys Lys Leu Glu Thr     |     |     |     |
| 65  | 70  | 75  | 80  |
| gtc ccg gca aat aat aaa ctc cat att atc caa ttc aat gga cca att 288 |     |     |     |
| Val Pro Ala Asn Asn Lys Leu His Ile Ile Gln Phe Asn Gly Pro Ile     |     |     |     |
| 85  | 90  | 95  |     |
| tta gaa gaa aca aaa cag cag ctg gaa aaa aca ggg gca aag att ctc 336 |     |     |     |
| Leu Glu Glu Thr Lys Gln Gln Leu Glu Lys Thr Gly Ala Lys Ile Leu     |     |     |     |
| 100   | 105 | 110 |     |
| gac tac ata cct gat tat gct tac att gtc gag tat gag ggc gat gtt 384 |     |     |     |
| Asp Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val     |     |     |     |
| 115   | 120 | 125 |     |
| aag tca gca aca agc acc att gag cac gtg gaa tcc gtg gag cct tat 432 |     |     |     |
| Lys Ser Ala Thr Ser Thr Ile Glu His Val Glu Ser Val Glu Pro Tyr     |     |     |     |
| 130   | 135 | 140 |     |
| ttg ccg ata tac aga ata gat ccc cag ctt ttc aca aaa ggg gca tca 480 |     |     |     |
| Leu Pro Ile Tyr Arg Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser     |     |     |     |
| 145   | 150 | 155 | 160 |
| gag ctt gta aaa gca gtg gcg ctt gat aca aag cag aaa aat aaa gag 528 |     |     |     |

|   |     |
|---|-----|
| Glu Leu Val Lys Ala Val Ala Leu Asp Thr Lys Gln Lys Asn Lys Glu |     |
| 165   | 170 |
| 175   |     |
| gtg caa tta aga ggc atc gaa caa atc gca caa ttc gca ata agc aat | 576 |
| Val Gln Leu Arg Gly Ile Glu Gln Ile Ala Gln Phe Ala Ile Ser Asn |     |
| 180   | 185 |
| 190   |     |
| gat gtg cta tat att acg gca aag cct gag tat aag gtg atg aat gat | 624 |
| Asp Val Leu Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp |     |
| 195   | 200 |
| 205   |     |
| gtt gcg cgt gga att gtc aaa gcg gat gtg gct cag agc agc tac ggg | 672 |
| Val Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly |     |
| 210   | 215 |
| 220   |     |
| ttg tat gga caa gga cag atc gta gcg gtt gcc gat aca ggg ctt gat | 720 |
| Leu Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp |     |
| 225   | 230 |
| 235   | 240 |
| aca ggt cgc aat gac agt tcg atg cat gaa gcc ttc cgc ggg aaa att | 768 |
| Thr Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile |     |
| 245   | 250 |
| 255   |     |
| act gca tta tat gca ttg gga cgg acg aat aat gcc aat gat acg aat | 816 |
| Thr Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn |     |
| 260   | 265 |
| 270   |     |
| ggt cat ggt acg cat gtg gct ggc tcc gta tta gga aac ggc tcc act | 864 |
| Gly His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ser Thr |     |
| 275   | 280 |
| 285   |     |
| aat aaa gga atg gcg cct cag gcg aat cta gtc ttc caa tct atc atg | 912 |
| Asn Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met |     |
| 290   | 295 |
| 300   |     |

gat agc ggt ggg gga ctt gga gga cta cct tcg aat ctg caa acc tta 960  
Asp Ser Gly Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu

305 310 315 320

ttc agc caa gca tac agt gct ggt gcc aga att cat aca aac tcc tgg 1008  
Phe Ser Gln Ala Tyr Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp

325 330 335

gga gca gca gtg aat ggg gct tac aca aca gat tcc aga aat gtg gat 1056  
Gly Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp

340 345 350

gac tat gtg cgc aaa aat gat atg acg atc ctt ttc gct gcc ggg aat 1104  
Asp Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn

355 360 365

gaa gga ccg aac ggc gga acc atc agt gca cca ggc aca gct aaa aat 1152  
Glu Gly Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn

370 375 380

gca ata aca gtc gga gct acg gaa aac ctc cgc cca agc ttt ggg tct 1200  
Ala Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser

385 390 395 400

tat gcg gac aat atc aac cat gtg gca cag ttc tct tca cgt gga ccg 1248  
Tyr Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro

405 410 415

aca aag gat gga cgg atc aaa ccg gat gtc atg gca ccg gga acg ttc 1296  
Thr Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Phe

420 425 430

ata cta tca gca aga tct tct ctt gca ccg gat tcc tcc ttc tgg gcg 1344  
Ile Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala

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|--|-----|-----|-----|
| 435  | 440 | 445 |     |
| aac cat gac agt aaa tat gca tac atg ggt gga acg tcc atg gct aca 1392 |     |     |     |
| Asn His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr      |     |     |     |
| 450  | 455 | 460 |     |
| ccg atc gtt gct gga aac gtg gca cag ctt cgt gag cat ttt gtg aaa 1440 |     |     |     |
| Pro Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys      |     |     |     |
| 465  | 470 | 475 | 480 |
| aac aga ggc atc aca cca aag cct tct cta tta aaa gcg gca ctg att 1488 |     |     |     |
| Asn Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile      |     |     |     |
| 485  | 490 | 495 |     |
| gcc ggt gca gct gac atc ggc ctt ggc tac ccg aac ggt aac caa gga 1536 |     |     |     |
| Ala Gly Ala Ala Asp Ile Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly      |     |     |     |
| 500  | 505 | 510 |     |
| tgg gga cga gtg aca ttg gat aaa tcc ctg aac gtt gcc tat gtg aac 1584 |     |     |     |
| Trp Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn      |     |     |     |
| 515  | 520 | 525 |     |
| gag tcc agt tct cta tcc acc agc caa aaa gcg acg tac tcg ttt act 1632 |     |     |     |
| Glu Ser Ser Ser Leu Ser Thr Ser Gln Lys Ala Thr Tyr Ser Phe Thr      |     |     |     |
| 530  | 535 | 540 |     |
| gct act gcc ggc aag cct ttg aaa atc tcc ctg gta tgg tct gat gcc 1680 |     |     |     |
| Ala Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala      |     |     |     |
| 545  | 550 | 555 | 560 |
| cct gcg agc aca act gct tcc gta acg ctt gtc aat gat ctg gac ctt 1728 |     |     |     |
| Pro Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu      |     |     |     |
| 565  | 570 | 575 |     |
| gtc att acc gct cca aat ggc aca cag tat gta gga aat gac ttt act 1776 |     |     |     |

Val Ile Thr Ala Pro Asn Gly Thr Gln Tyr Val Gly Asn Asp Phe Thr

580

585

590

tcg cca tac aat gat aac tgg gat ggc cgc aat aac gta gaa aat gta 1824

Ser Pro Tyr Asn Asp Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val

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ttt att aat gca cca caa agc ggg acg tat aca att gag gta cag gct 1872

Phe Ile Asn Ala Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala

610

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620

tat aac gta ccg gtt gga cca cag acc ttc tcg ttg gca att gtg aat 1920

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<211> 1923

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<212> *Bacillus sp.*

<400>

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10

15

att ttg tcg act gtt gcg tta agt aat cca tct gca ggt ggt gca agg 96

Ile Leu Ser Thr Val Ala Leu Ser Asn Pro Ser Ala Gly Gly Ala Arg

20

25

30

aat ttt gat ctg gat ttc aaa gga att cag aca aca act gat gct aaa 144

Asn Phe Asp Leu Asp Phe Lys Gly Ile Gln Thr Thr Thr Asp Ala Lys  
 35 40 45  
 ggt ttc tcc aag cag ggg cag act ggt gct gct gct ttt ctg gtg gaa 192  
 Gly Phe Ser Lys Gln Gly Gln Thr Gly Ala Ala Ala Phe Leu Val Glu  
 50 55 60  
 tct gaa aat gtg aaa ctc cca aaa ggt ttg cag aag aag ctt gaa aca 240  
 Ser Glu Asn Val Lys Leu Pro Lys Gly Leu Gln Lys Lys Leu Glu Thr  
 65 70 75 80  
 gtc ccg gca aat aat aaa ctc cat att atc caa ttc aat gga cca att 288  
 Val Pro Ala Asn Asn Lys Leu His Ile Ile Gln Phe Asn Gly Pro Ile  
 85 90 95  
 tta gaa gaa aca aaa cag cag ctg gaa aaa aca ggg gca aag att ctc 336  
 Leu Glu Glu Thr Lys Gln Gln Leu Glu Lys Thr Gly Ala Lys Ile Leu  
 100 105 110  
 gac tac ata cct gat tat gct tac att gtc gag tat gag ggc gat gtt 384  
 Asp Tyr Ile Pro Asp Tyr Ala Tyr Ile Val Glu Tyr Glu Gly Asp Val  
 115 120 125  
 aag tca gca aca agc acc att gag cac gtg gaa tcc gtg gag cct tat 432  
 Lys Ser Ala Thr Ser Thr Ile Glu His Val Glu Ser Val Glu Pro Tyr  
 130 135 140  
 ttg ccg ata tac aga ata gat ccc cag ctt ttc aca aaa ggg gca tca 480  
 Leu Pro Ile Tyr Arg Ile Asp Pro Gln Leu Phe Thr Lys Gly Ala Ser  
 145 150 155 160  
 gag ctt gta aaa gca gtg gcg ctt gat aca aag cag aaa aat aaa gag 528  
 Glu Leu Val Lys Ala Val Ala Leu Asp Thr Lys Gln Lys Asn Lys Glu  
 165 170 175

gtg caa tta aga ggc atc gaa caa atc gca caa ttc gca ata agc aat 576  
 Val Gln Leu Arg Gly Ile Glu Gln Ile Ala Gln Phe Ala Ile Ser Asn  
 180 185 190  
 gat gtg cta tat att acg gca aag cct gag tat aag gtg atg aat gat 624  
 Asp Val Leu Tyr Ile Thr Ala Lys Pro Glu Tyr Lys Val Met Asn Asp  
 195 200 205  
 gtt gcg cgt gga att gtc aaa gcg gat gtg gct cag agc agc tac ggg 672  
 Val Ala Arg Gly Ile Val Lys Ala Asp Val Ala Gln Ser Ser Tyr Gly  
 210 215 220  
 ttg tat gga caa gga cag atc gta gcg gtt gcc gat aca ggg ctt gat 720  
 Leu Tyr Gly Gln Gly Gln Ile Val Ala Val Ala Asp Thr Gly Leu Asp  
 225 230 235 240  
 aca ggt cgc aat gac agt tcg atg cat gaa gcc ttc cgc ggg aaa att 768  
 Thr Gly Arg Asn Asp Ser Ser Met His Glu Ala Phe Arg Gly Lys Ile  
 245 250 255  
 act gca tta tat gca ttg gga cgg acg aat aat gcc aat gat acg aat 816  
 Thr Ala Leu Tyr Ala Leu Gly Arg Thr Asn Asn Ala Asn Asp Thr Asn  
 260 265 270  
 ggt cat ggt acg cat gtg gct ggc tcc gta tta gga aac ggc tcc act 864  
 Gly His Gly Thr His Val Ala Gly Ser Val Leu Gly Asn Gly Ser Thr  
 275 280 285  
 aat aaa gga atg gcg cct cag gcg aat cta gtc ttc caa tct atc atg 912  
 Asn Lys Gly Met Ala Pro Gln Ala Asn Leu Val Phe Gln Ser Ile Met  
 290 295 300  
 gat agc ggt ggg gga ctt gga gga cta cct tcg aat ctg caa acc tta 960  
 Asp Ser Gly Gly Gly Leu Gly Gly Leu Pro Ser Asn Leu Gln Thr Leu

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|--|-----|-----|-----|
| 305  | 310 | 315 | 320 |
| ttc agc caa gca tac agt gct ggt gcc aga att cat aca aac tcc tgg 1008 |     |     |     |
| Phe Ser Gln Ala Tyr Ser Ala Gly Ala Arg Ile His Thr Asn Ser Trp      |     |     |     |
| 325  | 330 | 335 |     |
| gga gca gca gtg aat ggg gct tac aca aca gat tcc aga aat gtg gat 1056 |     |     |     |
| Gly Ala Ala Val Asn Gly Ala Tyr Thr Thr Asp Ser Arg Asn Val Asp      |     |     |     |
| 340  | 345 | 350 |     |
| gac tat gtg cgc aaa aat gat atg acg atc ctt ttc gct gcc ggg aat 1104 |     |     |     |
| Asp Tyr Val Arg Lys Asn Asp Met Thr Ile Leu Phe Ala Ala Gly Asn      |     |     |     |
| 355  | 360 | 365 |     |
| gaa gga ccg aac ggc gga acc atc agt gca cca ggc aca gct aaa aat 1152 |     |     |     |
| Glu Gly Pro Asn Gly Gly Thr Ile Ser Ala Pro Gly Thr Ala Lys Asn      |     |     |     |
| 370  | 375 | 380 |     |
| gca ata aca gtc gga gct acg gaa aac ctc cgc cca agc ttt ggg tct 1200 |     |     |     |
| Ala Ile Thr Val Gly Ala Thr Glu Asn Leu Arg Pro Ser Phe Gly Ser      |     |     |     |
| 385  | 390 | 395 | 400 |
| tat gcg gac aat atc aac cat gtg gca cag ttc tct tca cgt gga ccg 1248 |     |     |     |
| Tyr Ala Asp Asn Ile Asn His Val Ala Gln Phe Ser Ser Arg Gly Pro      |     |     |     |
| 405  | 410 | 415 |     |
| aca aag gat gga cgg atc aaa ccg gat gtc atg gca ccg gga acg ttc 1296 |     |     |     |
| Thr Lys Asp Gly Arg Ile Lys Pro Asp Val Met Ala Pro Gly Thr Phe      |     |     |     |
| 420  | 425 | 430 |     |
| ata cta tca gca aga tct tct ctt gca ccg gat tcc tcc ttc tgg gcg 1344 |     |     |     |
| Ile Leu Ser Ala Arg Ser Ser Leu Ala Pro Asp Ser Ser Phe Trp Ala      |     |     |     |
| 435  | 440 | 445 |     |
| aac cat gac agt aaa tat gca tac atg ggt gga acg tcc atg gct aca 1392 |     |     |     |

Asn His Asp Ser Lys Tyr Ala Tyr Met Gly Gly Thr Ser Met Ala Thr  
 450 455 460  
 ccg atc gtt gct gga aac gtg gca cag ctt cgt gag cat ttt gtg aaa 1440  
 Pro Ile Val Ala Gly Asn Val Ala Gln Leu Arg Glu His Phe Val Lys  
 465 470 475 480  
 aac aga ggc atc aca cca aag cct tct cta tta aaa gcg gca ctg att 1488  
 Asn Arg Gly Ile Thr Pro Lys Pro Ser Leu Leu Lys Ala Ala Leu Ile  
 485 490 495  
 gcc ggt gca gct gac atc ggc ctt ggc tac ccg aac ggt aac caa gga 1536  
 Ala Gly Ala Ala Asp Ile Gly Leu Gly Tyr Pro Asn Gly Asn Gln Gly  
 500 505 510  
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 Trp Gly Arg Val Thr Leu Asp Lys Ser Leu Asn Val Ala Tyr Val Asn  
 515 520 525  
 gag tcc agt tct cta tcc acc agc caa aaa gcg acg tac tcg ttt act 1632  
 Glu Ser Ser Ser Leu Ser Thr Ser Gln Lys Ala Thr Tyr Ser Phe Thr  
 530 535 540  
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 Ala Thr Ala Gly Lys Pro Leu Lys Ile Ser Leu Val Trp Ser Asp Ala  
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 Pro Ala Ser Thr Thr Ala Ser Val Thr Leu Val Asn Asp Leu Asp Leu  
 565 570 575  
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 580 585 590

tcg cca tac aat gat aac tgg gat ggc cgc aat aac gta gaa aat gta 1824

Ser Pro Tyr Asn Asp Asn Trp Asp Gly Arg Asn Asn Val Glu Asn Val

595

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ttt att aat gca cca caa agc ggg acg tat aca att gaa gta cag gct 1872

Phe Ile Asn Ala Pro Gln Ser Gly Thr Tyr Thr Ile Glu Val Gln Ala

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tat aac gta ccg gtt gga cca cag aac ttc tcg ttg gca att gtg aat 1920

Tyr Asn Val Pro Val Gly Pro Gln Asn Phe Ser Leu Ala Ile Val Asn

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